

REMARKS

With claims 1-36 previously pending, claims 8, 12-17, 20-23, 26-32 and 34 have been withdrawn under a restriction requirement. With this response, claim 33 has further been cancelled.

Section 102 Rejection

Claims 1-5, 9-10, 18-19 and 33-36 stand rejected under 35 U.S.C. 102 as being anticipated by Patel et al. (U.S. 6,550,263)(hereafter Patel). The Office Action states that Patel discloses in Figs. 5-6 a cooling assembly comprising: “probe elements 531, an electronic package 405 having a cavity 409, a plurality of dies 401 that face the bottom surface 403 and a coolant surrounding interconnects within the cavity 409, an inlet 411 and an outlet 413 coolant ports that allow the coolant to enter the cavity 409.” This rejection is respectfully traversed.

The item 531 of Patel indicated by the Office Action to be “probe elements 531” are identified in Patel, col. 10, lines 45-47 as being “fins 531.” Fig. 6 shows fins 531 extending from a heat sink 509. Patel further discloses one or more “chips 501” mounted on a substrate 517 in col. 9, lines 27-40, but the fins 531 are not disclosed as coupled to any of the chips 501.

Claim 1 claims “probe elements” and a “package coupled to the probe elements, wherein the package includes at least one die.” Probe elements are identified on page 12, paragraph 47 of Applicant’s specification as including “tungsten needles, vertical probes, cobra probes, L-type probes, plunger probes, spring contact probes and contact bump probes formed on a membrane.” None of the probe examples include cooling fins 531 as

typically found attached to a heat sink 509 as disclosed in Patel. Accordingly, Claim 1 is believed allowable as not anticipated by Patel.

Claims 2-5, 9-10 and 18-19 and 35 are believed allowable as not anticipated by Patel based at least on their dependence on claim 1.

Claim 33 has been cancelled rendering this rejection moot with respect to claim 33.

Claim 36 claims “probe elements” similar to claim 1, and is believe allowable over Patel based on the “fins 531” of Patel not reading on “probe elements” as described with respect to claim 36. Claim 36 further recites “a package coupled to the probe elements ... wherein the package includes at least one die with active electronic components electrically connected to the probe elements.” As indicated, the fins 531 of Patel do not electrically connect to its chips 501. Accordingly, claim 36 is further believed allowable as not anticipated by Patel.

Section 103 Rejection

Claims 11 and 24-25 stand rejected under 35 U.S.C. 103 as being unpatentable over Patel in view of Dozier (U.S. 6,534,586). The Office Action states that Patel teaches “a cooling assembly comprising: an electronic package 405, Figs. 5-6, having a cavity 409, a plurality of dies 401; a bottom substrate 403, wherein active electronic components face the bottom surface 403 and a coolant surrounding interconnects within the cavity 409, an inlet 411 and an outlet 413 coolant ports that allow the coolant to enter the cavity 409, wherein each die has at least one active surface associated with respective active electronic components, and wherein the coolant circulated in the cavity to directly

cool each active surface of each die 401.” The Office Action continues indicating that Patel fails to disclose interconnects being compliant and comprising lithographic springs, but that Dozier teaches lithographically patterned spring contacts, referencing Fig. 2. The Office Action states it would have been obvious to one skilled in the art to employ the IC photo lithographically patterned spring interconnects of Dozier in Patel to decrease mechanical stress caused by thermal expansion of the components (to reduce thermal gradients on each active surface of each die.) This rejection is respectfully traversed.

Patel does not disclose any structure requiring the use of “compliant interconnects” so a person of ordinary skill would have no motive to combine Patel with Dozier. As indicated with respect to the Section 102 rejection above, Patel discloses using fins 531 attached to a heat sink 509. The fins 531 are separate from connections between chips 501 mounted on a substrate 517. The connections between the chips 501 and substrate 517 are not disclosed in the description of Patel. The “chips 501” disclosed by Patel, as opposed to the claimed “dies” typically include lead frames for plugging into a socket, and the lead frames do not include the “compliant interconnects” claimed. Chips typically contain dies that have connection pads wire bonded to a lead frame of the chip. With the chips including lead frames, a further use of compliant interconnects to connect to the chip lead frame will not be necessary. Accordingly, with the cooling device of Patel designed to accommodate a standard chip with a lead frame, no motive is provided to combine Patel with Dozier to further use compliant interconnects. Accordingly, claims 11 and 24-25 are believed allowable as not non-obvious over Patel in view of Dozier.

Allowable Subject Matter

Claims 6-7 are objected to as being dependent upon a rejected base claim, but are indicated to be allowable if rewritten in independent form. Based on the allowability of claim 1, on which claims 6-7 depend, as discussed above, claims 6-7 are believed allowable in dependent form.

Conclusion

In light of the above amendments and remarks, claims 1-32 and 34-36 are now all believed to be in condition for allowance. Accordingly, reconsideration and allowance of these claims is respectfully requested.

No fee is believed due with this response. Should a fee be due, the Commissioner is authorized to charge any underpayment to Deposit Account No. 06-1325.

Respectfully submitted,

Date:

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